CLAIMS

What is claimed is:

1. A mechanical device comprising:

a first mechanical resonator; and

a second mechanical resonator electrostatically coupled to the first mechanical resonator.

2. The device of claim 1 wherein the device acts as a frequency selective filter, a frequency converter or an amplifier.

3. The device of claim 1 wherein the device acts as a detector of applied force or a detector of mass collected on one of the resonators.

4. The device of claim 1 wherein the first and second resonators comprise oxide buried beneath single crystal silicon.

5. The device of claim 4 wherein the first and second resonators are approximately 1 um thick.

6. The device of claim 4 wherein the first and second resonators comprise paddles having wirebonded contact wires coupled thereto.

7. The device of claim 1 wherein the first and second resonators comprise torsional resonators positioned in close proximity.

8. The device of claim 7 wherein the torsional resonators comprise paddles suspended by narrow beams.

9. The device of claim 1 and further comprising:
a laser; and
a photo receiver.

10. The device of claim 9 wherein the mechanical resonators are selected from the group consisting of cantilevers, double-supported beams, drum-like membranes, torsional and translational resonators.

11. The device of claim 9 wherein the amplifier provides amplification of signals in cell phones, from magnetic force imaging apparatus, satellite communication, radars and radios.

12. The device of claim 9 wherein the amplifier comprises a portion of a device selected from the group consisting of chemical sensors, magnetic sensors, electric field sensors, light sensors, atomic force microscopes, and thermal sensors.

13. The device of claim 1 and further comprising means for sensing motion of a resonator.

14. The device of claim 13 wherein the means for sensing motion of a resonator senses such motion by detecting changes in capacitance.

15. A mechanical device comprising:
a first mechanical resonator having a first resonant frequency;
an input signal applied to the resonator about the first resonant frequency;
a second mechanical resonator electrostatically coupled to the first mechanical resonator, wherein the second mechanical resonator has a second resonant frequency; and

a pump, coupled to the second mechanical resonator for providing a signal based on the sum of the input signal and a second signal close to the second resonant frequency.

16. The device of claim 15 and further comprising an optical detector that generates a signal representative of oscillation of the first resonator.

17. The device of claim 16 and further comprising:
a laser; and
a photo receiver.

18. A method of processing an AC input signal, the method comprising:
applying the input signal to a first mechanical resonator;
applying the input signal and a second signal to a second mechanical resonator that is electrostatically coupled to the first mechanical resonator; and
measuring movement of the first mechanical resonator.

19. The method of claim 18, wherein the second signal is approximately equal to a resonant frequency of the second mechanical resonator.

20. The method of claim 18 and further comprising sweeping the second signal about the resonant frequency of the second mechanical resonator to find a desired frequency for the second signal.

21. The method of claim 18 and further comprising modifying a resonator bias voltage.

22. The method of claim 18 and further comprising modifying a mechanical resonator to change its resonant frequency.